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Supplemental Amendment
U.S. Serial Number: 09/553,107
Reply to Office Action of: 04/11/2007
Docket/Family Number: GJH-0018/P1998J107D

REMARKS

In further response to the Office Action mailed on April 11, 2007, Applicants provide the following additional remarks. In the previous reply, Applicants discussed the hydrogen consumption in Harrison. This supplemental reply supplies further discussion to demonstrate that one of ordinary skill in the art would find that Harrison fails to describe the claimed invention.

In the previous reply, Applicants demonstrated that the Examples in Harrison do not satisfy the claimed requirement that the amount of hydrogen in the hydrogen treat gas in the second stage is less than or equal to 3 times the hydrogen consumption in the second stage. Applicants now further show that the amount of hydrogen introduced in Harrison is in fact more than 3 times the hydrogen consumption for the entire reaction system in Harrison. Since all of the hydrogen in Harrison is introduced into the second stage, if the amount of hydrogen in the Harrison treat gas is greater than 3 times the hydrogen consumption of the entire system, then it must follow that the amount of hydrogen in the treat gas is also greater than 3 times the hydrogen consumption in the second stage.

To demonstrate the hydrogen consumption in Harrison, Example 5 will be used as it provides the lowest ratio of treat gas provided to hydrogen consumption. In the following calculations, hydrogen consumption will be calculated using a model that matches the physical characteristics of the feed as specified in Harrison, while allowing for as much hydrogen consumption as possible.

Harrison states that the average molecular weight of the molecules in its feedstock is 365. In the following discussion all aromatics in Harrison are assumed to be 2 ring aromatics that have the average molecular weight of the feed. For aromatics that are converted into non-aromatic molecules, it will be assumed that the molecule is

fully saturated. For aromatics that still remain aromatics in the product, it will be assumed that some hydrogenation still occurs, so that one of the two aromatic rings becomes saturated. It is believed that this provides the maximum hydrogen consumption, while still corresponding to the average molecular weight specified in Harrison.

Based on the above assumptions, the relative hydrogen consumption in Harrison can be calculated. In example 5, the feed provided contains 27.7 vol% aromatics while the product is 16.6% aromatics. The average feed molecular weight is specified as 365, while the density of the feed is 944 kg/m^3, which is equivalent to 944 g/liter. Based on these numbers, roughly 0.287 moles of aromatics are saturated per liter of feed. (944 x 11.1/100 x 1/365) As noted above, for the purpose of calculating hydrogen consumption, we will assume that all of the aromatics are two-ring aromatics that are converted to fully saturated two-ring naphthenes. This would require 5 moles of H_2 per mole of aromatic converted, or 1.435 moles H_2. Additionally, the remaining 16.6 vol% aromatics in the product are also assumed to be saturated from a two-ring aromatic to a one-ring aromatic. This requires an additional 2 moles of H_2 per mole of aromatic molecules, or 0.858 moles of H_2. Thus, the total H_2 consumption in this model calculation is 2.293 moles of H_2 per liter of feed. Note that any amount of hydrogen consumed by desulfurization is small relative to the hydrogen consumed by aromatic saturation.

As shown above, the total H_2 consumption is 2.293 moles per liter of feed. Based on the feed flow rate provided in Example 5, this corresponds to 322 SCF/b. By contrast, the flow rate for hydrogen treat gas into the Harrison reactor is 1370 SCF/b. Thus, the ratio of hydrogen provided to hydrogen consumed in Harrison is greater than about 4.25, for the entire reactor in Harrison. Again, if the ratio of hydrogen provided to hydrogen consumed in the entire reactor is greater than about 4.25, then the ratio of hydrogen provided to hydrogen consumed in only the second reaction stage will be still

higher. As a result, Harrison does not describe or suggest the claimed requirement of providing less than or equal to 3 times the hydrogen consumption of the second reaction stage.

Finally, in the prior response, Applicants provided calculations for hydrogen consumption in the second stage of the Harrison reactor, but with a different model for hydrogen consumption. (In the prior response, all aromatics were treated as benzene, an assumption that does not match the average molecular weight described in Harrison.) The model described in this Supplemental amendment, where all aromatics are assumed to be two ring aromatics having the average molecular weight of the feed, can be used to replace Applicants assumption in the prior response that all aromatics were benzene.

As noted in the prior response, the maximum amount of aromatics saturated in the second stage is roughly 5 vol%. Using the assumptions that all aromatics are two ring aromatics with a molecular weight of 365, and assuming that the second stage also saturates one ring of any aromatic remaining in the product, the resulting total hydrogen consumption in the second stage is around 0.8 moles per hour. Because the lowest listed hydrogen treat gas rate is 5 moles per hour or more, the ratio of hydrogen treat gas to hydrogen consumption in the second stage is at least above 5.

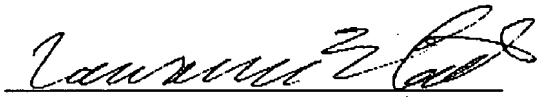
Conclusion

Having demonstrated that all rejections of claims have been overcome, this application is in condition for allowance. Accordingly, applicants request early and favorable reconsideration in the form of a Notice of Allowance.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated, since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response. Please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1330.

Respectfully submitted,



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